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The relation among coalminer's self-efficacy, safety attitude and risk-taking behavior

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Abstract

In order to study the relation among coalminer's self-efficacy, safety attitude and risk-taking behavior, this paper studied literatures about them, conducted a survey by questionnaire, and then, made a verification analysis by SEM. The results showed as follows: self-efficacy could not only predict safety attitude positively, but also predict risk-taking behavior negatively; safety attitude could predict risk-taking behavior negatively; safety attitude is the intermediary variable of self-efficacy and risk-taking behavior.

Keywords: coalminer; self-efficacy; safety attitude; risk-taking behavior

1. Literature Review

At present, research on self-efficacy, the belief in one's ability to perform a given task[5][6], has generally supported positive relationships between self-efficacy and a range of performance measures and outcomes. In the field of social psychology, the study of behavior-attitude relationships has engendered numerous debates that have brought about distinct theories. Ajzen[7] points out the relationship between attitudes and behavior could be more predictable, when it includes additional variables, such as previous behavior. Lin zeyan[4] found there is a high correlation between the risk-taking behavior of coal miners and the man-made accidents.

Coalminers are a huge special occupational group. The safety of production activities is related to the people's life and property, even the overall situation of reform, development and social stability. If the coal enterprises can not guarantee the basic safety for the miners, the quality and output will be nothing. Therefore, it is the most urgent task to recognize the relations among miners' self-efficacy, safety attitude and risk-taking behavior.

2. Research Methods

2.1. Research Objects

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We issued 1,800 copies of the questionnaire, 1,479 were recovered in Da anshan coalmine (response rate was 82.2%). Our questionnaire items were removed based on three principles: the questionnaire items have missed more than three; the answers clearly varied regularly; the two scores' difference between the same questions is 3 or more. There were 1,229 Copies of questionnaires left by removing the invalid ones (effective rate was 68.3%). The ages of samples ranged between 18 and 55 years old, and the average age was 36.9 years. Among them, below the age of 20 was 97 (7.9%), 25-30 years was 158 (12.9%) ,31-35 years was 177 (14.4%) 36-40 years was 316 (25.7%), 41-45 years was 243 (19.8%) ,46-50 years was 114 people (9.3%), more than 50 years was 44 (3.6%), and the other 80 persons' age values was missing. The post time of samples ranged from 1 to 55 years, and the average was 10.5 years. Their marital status was that 148 for the single, 959 married, 34 divorced, and 88 persons' marital status values missed.

2.2. Measuring Tools

⑴Self-Efficacy Scale

This paper adopted the General Self-Efficacy Scale for Chinese translation, which was completed by Zhang and Schwarzer in 1995[8]. The single-factor scale has 10 items. We use the Likert scale of 5 points, "1" for "strongly disagree", "5" for "strongly agree", and it represents the extent of agreement from low to high. In the survey the scale's internal consistency coefficient is 0.85, split-half reliability is 0.80, indicating that the scale has good reliability and validity to measure the samples' self-efficacy.

⑵Safety Attitude Scale

We developed a Safety Attitude Scale, combined with related literature and the actual practice in China. There are three dimensions as follows: security values, risk prediction and internal tendencies, and each dimension has four items. We use the Likert scale of 5 points, "1" for "strongly disagree", "5" for "strongly agree", and it represents the extent of agreement from low to high. In the survey the scale's internal consistency coefficient is 0.74, split-half reliability is 0.71, indicating that the scale has good reliability and validity to measure the safety attitude.

⑶Risk-Taking Behavior Scale

This scale was adapted from the Risk-Taking Behavior Scale for miners[9], including conscious risk-taking behavior and unconscious risk-taking behavior, and each dimension has four items. We use the Likert scale of 5 points, "1" for "strongly disagree", "5" for "strongly agree", and it represents the extent of agreement from low to high. In the survey the scale's internal consistency coefficient is 0.91, split-half reliability is 0.84, indicating that the scale has good reliability and validity to measure the risk-taking behavior.

2.3. Statistical Tools

We make the statistical analysis by SPSS16.0 and Amos7.0.

3. Results and Discussion

3.1. Relationship between Self-Efficacy and Safety Attitude

Through analyzing the correlation of self-efficacy and safety attitude, shown as Tab. 1, there is a positive correlation between self-efficacy and each dimension of safety attitude. The stronger self-efficacy the coalminers have, the more correct safety attitude they will hold. But the strength of the correlation is general. There is not a simple linear relationship between the two variables, but self-efficacy is one factor to safety attitude.

Table 1 Related analysis of self-efficacy and safety attitude

Correlation	Safety Attitude		
	Security values	Risk prediction	Internal tendencies
Self-efficacy	0.373(**)	0.353(**)	0.368(**)

a. Note: ** indicates P <0.01

3.2. Relationship between Safety Attitude and Risk-Taking Behavior

Through analyzing the correlation of safety attitude and risk-taking behavior, shown as Tab.2, there is a strong negative correlation between each dimension of safety attitude and risk-taking behavior. The more correct safety attitude the coalminers hold, the less risky behavior they will take. The correlation coefficient of unconscious risk-taking behavior and safety attitude among the various dimensions is not "0", although it is almost without consciousness of domination.

The situation must be caused by the inertia behavior of coalminers. When the miners have the right safety attitude, they will avoid taking risky behavior consciously.

Table 2 Related analysis of safety attitude and risk-taking behavior

Correlation	Risk-taking Behavior	
	Conscious risk-taking behavior	Unconscious risk-taking behavior
Security values	-0.563(**)	-0.417(**)
Risk prediction	-0.522(**)	-0.409(*)
Internal tendencies	-0.543 (**)	-0.386 (**)

b. Note: * indicates P <0.05;** indicates P <0.01

3.3 Relationship between Self-Efficacy and Risk-Taking Behavior

Through analyzing the correlation of self-efficacy and risk-taking behavior, shown as Tab.3, there is a strong negative correlation between each dimension of self-efficacy and risk-taking behavior. It means that the stronger self-efficacy the coalminers have, the less risky behavior they will take. But the strength of the correlation is weak. Because self-efficacy has a little direct effect on risk-taking behavior, and the achievement of the effect depends largely upon safety attitude, the intermediary variable.

Table 3 Related analysis of self-efficacy and risk-taking behavior

Correlation	Risk-taking Behavior	
	Conscious risk-taking behavior	Unconscious risk-taking behavior
Self-efficacy	-0.201(**)	-0.176(**)

c. Note: ** indicates P <0.01

3.4. Structural Equation Modeling

We use structural equation modeling (SEM) to further analysis the relationship among variables, and the data fitting results are shown as Tab. 4 and Fig.1. (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10 stand for Self-Efficacy items; S1 stands for Security Values, S2 stands for Risk Prediction, S3 stands for Internal Tendencies; R1 stands for Conscious Risk-Taking Behavior, R2stands for Unconscious Risk-Taking Behavior.)

Table 4 Fitting results

Fitting index							
χ^2/ DF	GFI	NFI	CFI	RFI	IFI	RMR	RMSEA
4.245	0.900	0.921	0.903	0.950	0.903	0.015	0.076

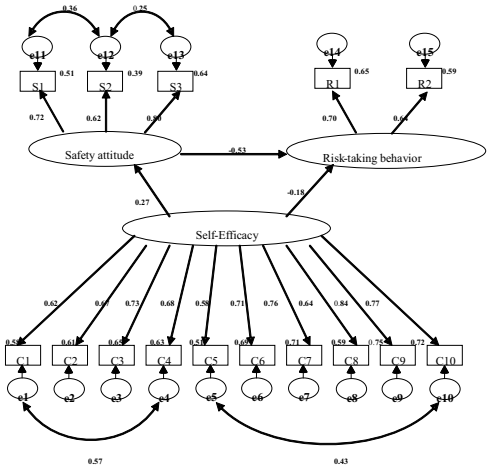

Fig.1 SEM of self-efficacy, safety attitudes and risk-taking behavior

The results showed that, the value of $\chi 2/DF$ was less than 5, CFI, GFI, IFI, NFI were larger than 0.9, RMSEA was less than 0.08. All of the above have reached acceptable levels, indicating theoretical model and the data fit well. It can be derived from the model that both self-efficacy and safety attitude could predict risk-taking behavior negatively, and safety attitude is the intermediary variable of self-efficacy and risk-taking behavior.

4. Conclusion

Empirical results showed as follows: (1) Self-efficacy could not only predict safety attitude positively, but also predict risk-taking behavior negatively, and safety attitude could predict risk-taking behavior negatively. (2) Safety attitude is the intermediary variable of self-efficacy and risk-taking behavior.

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